**IN THE CLAIMS:**

1. (Original): A method, comprising:

providing multiple transmission bandwidth streams with differentiated quality of service on a digital bit-stream inter-machine trunk located between a first packet router and a second packet router including:

segregating a packet stream into at least a high-quality of service packet stream and a low-quality of service packet stream using a packet processor located at the first packet router;

buffering the high-quality of service packet stream using a high-quality of service queue;

buffering the low-quality of service packet stream using a low-quality of service queue;

formatting the high-quality of service packet stream to generate a first data stream channel independently of the low-quality of service packet stream;

formatting the low-quality of service packet stream to generate a second data stream channel independently of the high-quality of service packet stream;

time-division multiplexing the first data steam channel and the second data stream channel to define a multiplexed data stream including a plurality of payloads, wherein at least some of each of the plurality of payloads of the multiplexed data stream includes a high-quality of service portion and a low-quality of service portion; and

transmitting the multiplexed data stream on the digital bit stream inter-machine trunk using the first packet router.

2. (Original): The method of claim 1, wherein a sum of a first bit-rate of the first data stream channel and a second bit-rate of the second data stream channel is substantially equal to a utilized payload bit-rate of the multiplexed data stream.

3. (Original): The method of claim 1, further comprising allocating a first part of each payload of the multiplexed data stream to the high-quality of service portion and a second part of each payload of the multiplexed data stream to the low-quality of service

portion.

4. (Original): The method of claim 3, further comprising reallocating a fraction of the first part of at least some of each of the plurality of payloads of the multiplexed data stream to the second part of each payload of the multiplexed data stream.

5. (Original): The method of claim 4, further comprising detecting a paucity of traffic requiring the first data stream channel before reallocating.

6. (Original): The method of claim 3, further comprising reallocating a fraction of the second part of at least some of each of the plurality of payloads of the multiplexed data stream to the first part of each payload of the multiplexed data stream.

7. (Original): The method of claim 6, further comprising detecting a congestion of traffic requiring the first data stream channel before reallocating.

8. (Original): The method of claim 1, wherein segregating includes segregating the packet stream into another-quality of service packet stream using the packet processor located at the first packet router, and further comprising,

buffering the another-quality of service packet stream using another-quality of service queue; and

formatting the another-quality of service packet stream to generate a third data stream channel independently of both the low-quality of service packet stream and high-quality of service packet stream,

wherein time-division multiplexing includes time-division multiplexing the another data stream channel with the first data stream channel and the second data stream channel to define the multiplexed data stream, wherein a least some of each of the plurality of payloads of the multiplexed data stream includes another-quality of service portion.

9. (Original): The method of claim 1, further comprising prioritizing with respect to the

high-quality of service queue.

10. (Original): The method of claim 9, further comprising scheduling bandwidth with respect to the prioritized high-quality of service queue.

11. (Original): The method of claim 1, further comprising prioritizing with respect to the low-quality of service queue.

12. (Original): The method of claim 11, further comprising scheduling bandwidth with respect to the prioritized low-quality of service queue.

13. (Original): The method of claim 1, further comprising restricting packet size when an outbound packet exceeds a size threshold by segmenting the outbound packet into a plurality of packets, before formatting.

14. (Original): The method of claim 1, further comprising restricting packet size when an outbound packet exceeds a size threshold by segmenting the outbound packet into a plurality of packets, before segregating.

15. (Original): The method of claim 1, further comprising:

receiving the multiplexed data stream from the digital bit stream inter-machine trunk using the second packet router; and

time-division demultiplexing the first data steam channel and the second data stream channel from the multiplexed data stream using the second packet router.

16 - 17. (Canceled).

18. (Original): An apparatus, comprising:

a first packet router including a first packet processor;

a digital bit-stream inter-machine trunk coupled to the first packet router; and

a second packet router coupled to the digital bit-stream inter-machine trunk, the second packet router including a second packet processor,

wherein the first packet processor segregates a packet stream into at least a high-quality of service packet stream and a low-quality of service packet stream, and the first packet router:

buffers the high-quality of service packet stream using a high-quality of service queue;

buffers the low-quality of service packet stream using a low-quality of service queue;

formats the high-quality of service packet stream to generate a first data stream channel independently of the low-quality of service packet stream;

formats the low-quality of service packet stream to generate a second data stream channel independently of the high-quality of service packet stream;

time-division multiplexes the first data steam channel and the second data stream channel to define a multiplexed data stream including a plurality of payloads, wherein at least some of each of the plurality of payloads of the multiplexed data stream includes a high-quality of service portion and a low-quality of service portion;

and transmits the multiplexed data stream on the digital bit stream inter-machine trunk using the first packet router.

19. (Original): The apparatus of claim 18, wherein the digital bit stream inter-machine trunk is a transmission medium line.

20. (Original): The apparatus of claim 18, wherein the first packet router includes a segmentation manager that restricts packet size by segmenting an outbound packet into a plurality of packets when the outbound packet exceeds a size threshold.

21. (Original): The apparatus of claim 18, wherein the first packet router includes a queue manager coupled to the high-quality of service queue, the queue manager prioritizing with respect to the high-quality of service queue.

22. (Original): The apparatus of claim 21, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

23. (Original): The apparatus of claim 18, wherein the first packet router includes a queue manager that prioritizes with respect to the low-quality of service queue.

24. (Original): The apparatus of claim 23, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

25. (Original): The apparatus of claim 18, wherein the first packet router includes a queue manager coupled to both the high-quality of service queue and the low-quality of service queue, the queue manager determining prioritization with respect to both the high-quality of service queue and the low-quality of service queue.

26. (Original): The apparatus of claim 25, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manger.

27. (Original): A local area network, comprising the apparatus of claim 18.

28. (Original): A metropolitan area network, comprising the apparatus of claim 18.

29. (Original): A wide area network, comprising the apparatus of claim 18.

30. (Original): A method, comprising

providing multiple transmission bandwidth streams with differentiated quality of service on a digital bit-stream inter-machine trunk located between a first packet router and a second packet router including:

segregating a packet stream into at least a high-quality of service packet stream and a low-quality of service packet stream using a packet processor located at the first packet router;

buffering the high-quality of service packet stream using a high-quality of service queue;

buffering the low-quality of service packet stream using a low-quality of service queue;

formatting the high-quality of service packet stream to generate a first data stream channel independently of the low-quality of service packet stream;

formatting the low-quality of service packet stream to generate a second data stream channel independently of the high-quality of service packet stream;

buffering the first data stream channel using a high-quality of service first-in-first-out queue;

buffering the second data stream channel using a low-quality of service first-in-first-out queue;

statistical-multiplexing the first data steam channel and the second data stream channel to define a multiplexed data stream including a plurality of data structures selected from the group consisting of cells and frames; and

transmitting the multiplexed data stream on the digital bit stream inter-machine trunk using the first packet router.

31. (Original): The method of claim 30, wherein a sum of a first bit-rate of the first data stream channel and a second bit-rate of the second data stream channel is substantially equal to a utilized payload bit-rate of the multiplexed data stream.

32. (Original): The method of claim 30, wherein the plurality of data structures includes a plurality of cells and statistical-multiplexing includes cell-based-statistical-multiplexing.

33. (Original): The method of claim 30, wherein the plurality of data structures includes a plurality of frames and statistical-multiplexing includes frame-based-statistical-multiplexing.

34. (Original): The method of claim 33, wherein formatting the low-quality of service packet stream to generate a second data stream channel includes segmenting at least some of the plurality of frames.

35. (Original): The method of claim 30, further comprising allocating a first part of the multiplexed data stream to the high-quality of service portion and a second part of the multiplexed data stream to the low-quality of service portion.

36. (Original): The method of claim 35, further comprising reallocating a fraction of the first part of the multiplexed data stream to the second part of the multiplexed data stream.

37. (Original): The method of claim 36, further comprising detecting a paucity of traffic requiring the first data stream channel before reallocating.

38. (Original): The method of claim 35, further comprising reallocating a fraction of the second part of the multiplexed data stream to the first part of the multiplexed data stream.

39. (Original): The method of claim 38, further comprising detecting a congestion of traffic requiring the first data stream channel before reallocating.

40. (Original): The method of claim 30, wherein segregating includes segregating the packet stream into another-quality of service packet stream using the packet processor located at the first packet router, and further comprising,

buffering the another-quality of service packet stream using another-quality of service queue;

formatting the another-quality of service packet stream to generate a third data stream channel independently of both the low-quality of service packet stream and high-quality of service packet stream; and

buffering the third data stream channel using another first-in-first-out quality of service queue,

wherein statistical multiplexing includes statistical multiplexing the another data stream channel with the first data stream channel and the second data stream channel to define the multiplexed data stream.

41. (Original): The method of claim 30, further comprising prioritizing with respect to the high-quality of service queue.

42. (Original): The method of claim 41, further comprising scheduling bandwidth with respect to the prioritized high-quality of service queue.

43. (Original): The method of claim 30, further comprising prioritizing with respect to the low-quality of service queue.

44. (Original): The method of claim 43, further comprising scheduling bandwidth with respect to the prioritized low-quality of service queue.

45. (Original): The method of claim 30, further comprising restricting packet size when an outbound packet exceeds a size threshold by segmenting the outbound packet into a plurality of packets, before formatting.

46. (Original): The method of claim 30, further comprising:

receiving the multiplexed data stream from the digital bit stream inter-machine trunk using the second packet router; and

time-division demultiplexing the first data steam channel and the second data stream channel from the multiplexed data stream using the second packet router.

47 - 48. (Canceled).

49. (Original): An apparatus, comprising:

a first packet router including a first packet processor;

a digital bit-stream inter-machine trunk coupled to the first packet router; and

a second packet router coupled to the digital-bit stream inter-machine trunk, the second packet router including a second packet processor,

wherein the first packet processor segregates a packet stream into at least a high-quality of service packet stream and a low-quality of service packet stream, and the first packet router:

buffers the high-quality of service packet stream using a high-quality of service queue;

buffers the low-quality of service packet stream using a low-quality of service queue;

formats the high-quality of service packet stream to generate a first data stream channel independently of the low-quality of service packet stream;

formats the low-quality of service packet stream to generate a second data stream channel independently of the high-quality of service packet stream;

buffers the first data stream channel using a first-in-first-out high-quality of service queue;

buffers the second data stream channel using a first-in-first-out low-quality of service queue;

statistically multiplexes the first data steam channel and the second data stream channel to define a multiplexed data stream including a plurality of data structures selected from the group consisting of cells and frames; and

transmits the multiplexed data stream on the digital bit stream inter-machine trunk using the first packet router.

50. (Original): The apparatus of claim 49, wherein the digital bit stream inter-machine trunk is a transmission medium line.

51. (Original): The apparatus of claim 49, wherein the first packet router includes an

adaptation layer that segments at least some of the plurality of data structures.

52. (Original): The apparatus of claim 49, wherein the first packet router includes a segmentation manager that restricts packet size by segmenting an outbound packet into a plurality of packets when the outbound packet exceeds a size threshold.

53. (Original): The apparatus of claim 49, wherein the first packet router includes a queue manager coupled to the high-quality of service queue, the queue manager prioritizing with respect to the high-quality of service queue.

54. (Original): The apparatus of claim 53, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

55. (Original): The apparatus of claim 49, wherein the first packet router includes a queue manager that prioritizes with respect to the low-quality of service queue.

56. (Original): The apparatus of claim 55, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

57. (Original): The apparatus of claim 49, wherein the first packet router includes a queue manager coupled to both the high-quality of service queue and the low-quality of service queue, the queue manager determining prioritization with respect to both the high-quality of service queue and the low-quality of service queue.

58. (Original): The apparatus of claim 57, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manger.

59. (Original): A local area network, comprising the apparatus of claim 49.

60. (Original): A metropolitan area network, comprising the apparatus of claim 49.

61. (Original): A wide area network, comprising the apparatus of claim 49.

62. (Currently Amended): A method, comprising:

providing transmission bandwidth on a single inter-machine trunk located between a first packet router coupled to a source that transmits an outbound packet via a transmission medium and a second packet router coupled to a destination of the outbound packet via a transmission medium including:

restricting packet size using a packet processor located at the first packet router when [[an]] the outbound packet exceeds a size threshold by segmenting the outbound packet into a plurality of packets; and

transmitting the plurality of packets on the single inter-machine trunk using the first packet router.

63. (Original): The method of claim 62, wherein the transmission bandwidth is a single digital bit stream and the single inter-machine trunk is a transmission medium line.

64. (Original): The method of claim 62, wherein the size threshold is a function of an available bandwidth on the single inter-machine trunk.

65. (Original): The method of claim 64, wherein the available bandwidth is a repetitively measured available bandwidth and the size threshold is dynamically varied based on a calculated level of congestion on the single inter-machine trunk.

66. (Original): The method of claim 62, further comprising:

buffering the plurality of packets using a queue; and

prioritizing the queued plurality of packets.

67. (Original): The method of claim 66, further comprising scheduling bandwidth with

respect to the prioritized queued plurality of packets.

68. (Original): The method of claim 62, further comprising reassembling the plurality of packets into an inbound packet using a second packet processor located at the second packet router, wherein the inbound packet exceeds the size threshold.

69 - 70. (Canceled).

71. (Currently Amended): The method ~~of claim 62~~, comprising:

providing transmission bandwidth on a single inter-machine trunk located between a first packet router and a second packet router including:

restricting packet size using a packet processor located at the first packet router when an outbound packet exceeds a size threshold by segmenting the outbound packet into a plurality of packets; and

transmitting the plurality of packets on the single inter-machine trunk using the first packet router,

wherein providing transmission bandwidth on the single inter-machine trunk located between the first packet router and the second packet router includes providing multiple transmission bandwidth streams with differentiated quality of service on the single inter-machine trunk,

and further including:

segregating an outbound packet stream into a high-quality of service outbound packet stream and a low-quality of service outbound packet stream using the packet processor located at the first packet router;

buffering the high-quality of service outbound packet stream using a high-quality of service queue;

buffering the low-quality of service outbound packet stream using a low-quality of service queue;

transmitting the high-quality of service outbound packet stream on the single inter-machine trunk using a high-quality of service permanent virtual circuit; and

transmitting the low-quality of service outbound packet stream on the single inter-machine trunk using a low-quality of service permanent virtual circuit.

72. (Original): The method of claim 71, wherein the single inter-machine trunk is a transmission medium line.

73. (Original): The method of claim 71, wherein the outbound packet that exceeds the size threshold is from the low-quality of service outbound packet stream.

74. (Original): The method of claim 71, wherein the size threshold is a function of an available bandwidth on the single digital bit-stream inter-machine trunk.

75. (Original): The method of claim 74, wherein the available bandwidth is with regard to the high-quality of service permanent virtual circuit.

76. (Original): The method of claim 74, wherein the available bandwidth is a repetitively measured available bandwidth and the size threshold is dynamically varied based on a calculated level of congestion on the single digital bit-stream inter-machine trunk.

77. (Original): The method of claim 76, wherein both the repetitively measured available bandwidth and the calculated level of congestion are with regard to the high-quality of service permanent virtual circuit.

78. (Original): The method of claim 71, further comprising prioritizing with respect to the high-quality of service queue.

79. (Original): The method of claim 78, further comprising scheduling bandwidth with respect to the prioritized high-quality of service queue.

80. (Original): The method of claim 71, further comprising prioritizing with respect to the low-quality of service queue.

81. (Original): The method of claim 80, further comprising scheduling bandwidth with respect to the prioritized low-quality of service queue.

82. (Original): The method of claim 71, further comprising reassembling the plurality of packets into an inbound packet using a second packet processor at the second packet router, wherein the inbound packet exceeds the size threshold.

83 - 84. (Canceled):

85. (Currently Amended): An apparatus, comprising:

a first packet router coupled to a source that transmits an outbound packet via a transmission medium and including a first packet processor;

a single inter-machine trunk coupled to the first packet router; and

a second packet router coupled to the single inter-machine trunk and a destination of the outbound packet via a transmission medium, the second packet router including a second packet processor,

wherein the first packet processor restricts packet size by segmenting [[an]] the outbound packet into a plurality of packets when the outbound packet exceeds a size threshold.

86. (Original): The apparatus of claim 85, wherein the single inter-machine trunk is a transmission medium line.

87. (Original): The apparatus of claim 85, wherein the first packet router includes a queue and a queue manager coupled to the queue, the queue manager determining prioritization with respect to the queue.

88. (Original): The apparatus of claim 87, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

89. (Currently Amended): The apparatus ~~of claim 85~~, comprising:

a first packet router including a first packet processor;

a single inter-machine trunk coupled to the first packet router; and

a second packet router coupled to the single inter-machine trunk, the second packet router including a second packet processor,

wherein the first packet processor restricts packet size by segmenting an outbound packet into a plurality of packets when the outbound packet exceeds a size threshold, wherein the first packet router includes at least a high-quality of service outbound queue and a low-quality of service outbound queue, and wherein the first packet processor:

segregates an outbound packet stream into at least a high-quality of service outbound packet stream and a low-quality of service outbound packet stream;

buffers the high-quality of service packet stream using a high-quality of service queue;

buffers the low-quality of service packet stream using a low-quality of service queue;

transmits the high-quality of service packet stream on the single inter-machine trunk using a high-quality of service permanent virtual circuit; and

transmits the low-quality of service packet stream on the single inter-machine trunk using a low-quality of service permanent virtual circuit.

90. (Original): The apparatus of claim 89, wherein the first packet router includes a queue manager that prioritizes with respect to the high-quality of service queue.

91. (Original): The apparatus of claim 90, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

92. (Original): The apparatus of claim 89, wherein the first packet router includes a

queue manager that prioritizes with respect to the low-quality of service queue.

93. (Original): The apparatus of claim 92, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

94. (Original): The apparatus of claim 89, wherein the first packet router includes a queue manager coupled to both the high-quality of service queue and the low-quality of service queue, the queue manager determining prioritization with respect to both the high-quality of service queue and the low-quality of service queue.

95. (Original): The apparatus of claim 94, wherein the first packet router includes a time-interval manager coupled to the queue manager, the time-interval manager scheduling bandwidth with respect to the queue manager.

96. (Currently Amended): A local area network, comprising the apparatus of claim [[82]] 89.

97. (Currently Amended): A metropolitan area network, comprising the apparatus of claim [[82]] 89.

98. (Currently Amended): A wide area network, comprising the apparatus of claim [[82]] 89.